AN EXPERIMENT TO DETERMINE THE CONTRIBUTION OF SPEED PRACTICE DURING FIRST YEAR TYPING TO THE DEVELOPMENT OF TYPEWRITING SKILLS

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by

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CHAPTER I

THE PROBLEM AND DEFINITION OF TERMS USED

As head of the department of business training at the city high school[1] the writer was faced with the fact that there was a wide gap between the skill acquired in the high school typing course and the skill needed by the typist to meet business production requirements. That this feeling toward the high school trainee was widely experienced was revealed through a cursory reading of the essays and reports of investigations of commercial educators. Recognition of deficiencies in typewriting skill was repeatedly given in magazines on business and economic education such as The Journal of Business Education, The Balance Sheet, and the Business Education World. This feeling of disatisfaction was reflected in books by authors in the field such as Blackstone, Viteles, Myers, and Andruss, as well as in the summary on typewriting reported in the Encyclopedia of Educational Research. Practical proof of the inadequacies of typist training was given in discussions with business men who attempted to work with high school

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[1] Decatur City Schools, Decatur, Alabama

trainees and by the writer's personal experience of thirteen years employment in the business world working with, and supervising the work of, typist.

The feeling that the primary interests of high school business courses is no longer vocational[2] does not preclude the necessity for giving the pupil sufficient skill in the use of the typewriter to make typewriting vocationally profitable, in as much as personal-use typewriting is just as exact in its demands as vocational typewriting.[3] Irrespective of its ultimate use, the student in the high school classroom has the right to expect that his time will be devoted to the most profitable learning technique.

The writer had long felt that a disproportionate amount of the pupil's time was devoted to attempts to build rapid finger movement too early in the training period; that these attempts were generally ineffectual; and that a more profitable procedure would be to use the early training period to build skill in the use of the typewriter mechanisms, skill in applying the rules of grammatical

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[2]Paul Monroe, editor, Encyclopedia of Educational Research (Chicago: The Macmillan Publishing Company, 1941), pp. 322-4.

[3]D. D. Lessenberry, Manual for 20th Century Typewriting (Cincinnati: South-Western Publishing Co., 1942), p. 9.

construction and punctuation, skill in using the accepted printing symbols, in arranging letters artistically on the page, in organizing tabulations, and in handling paper, carbons and envelopes without waste of time and movements.

The question in the writer's mind was not whether speed in copying paragraphed material was desirable--speed and legibility are the two outstanding reasons for using the typewriter as a writing instrument. The question was, does copying from printed material under conditions set up to build speed actually result in the development of speed by the pupil in first year typing?

If the time spent by the first year typewriting pupil in drilling for speed resulted in the development of speed, there was little point in amassing data to support the thesis that correct usage should be built before building speed in manipulating the keys. Both skills are basic to the proficient use of the typewriter as a writing instrument regardless of which is mastered first.

If time spent by the pupil in drilling for speed, however, did not result in speed, would this time not be better spent drilling for the development of skill in the other aspects of usage? Attempts at building speed could be made at a later period in the training program.

Statement of the Problem. The problem was to determine whether pupils in first year typewriting developed a higher degree of skill by devoting time to practice for speed, or by devoting time to other aspects of typewriting proficiency.

In order to reach a conclusion, it was necessary, first, to determine the difference in rates of speed attained by pupils who received specific drills for speed and those who did not receive this practice. Subordinate to this was determining the relative skill attained by the two groups in correct usage of the typewriter in practical situations.

With this in mind, the writer made a careful study of the literature in the field of research in typewriting to ascertain the findings of other investigators.

Definition of Terms Used. In the absence of a widely accepted vocabulary of terms used by commercial teachers and/or business employers, the following usage was adopted in reporting this experiment:

Speed drills: Practice of letter combinations, word combinations and phrases; copying paragraphed material for 1, 2, 5, 10, or 15-minute periods of time.

Gross speed: Total number of words typed during the drill divided by the number of minutes the drill was maintained.

Net Speed: Gross words typed, minus penalty for errors, divided by number of minutes the drill was maintained.

Penalty for errors: Deduction of ten words for each incorrect letter, figure, or symbol; for each word omitted or repeated; and for each line or part of a line omitted or repeated.

Allied typing skills: Use of typewriter mechanisms, arrangement of letters on the page, use of varying accepted forms of letter arrangement and punctuation, grammatical construction, addressing envelopes, expression of numbers, tabulations, handling paper, carbons, and envelopes, art in erasing and replacing letters.

Typewriter mechanisms: Tabular stops, tabular key, back-space key, margin release, variable-line-space lever, paper-release lever, carriage scale, paper gauge indicator, ribbon control, type bar guide, ribbon reverse lever, and paper-guide scale.

Grammatical construction and punctuation rules: Standard English practice as taught in public high schools.

Accepted printing symbols: Dollar mark, number sign, pound sign, quotation marks, per cent sign, underscorer, ampersand, parentheses, asterisk, cent mark, at sign, and symbols for feet and inches.

The other terms used in this report follow the accepted pattern of general usage. All references to textbook material, letter forms, punctuation practices, and tabulation procedures are made to the presentations of D. D. Lessenberry in 20th Century Typewriting, Two-year Course, Fourth Edition, published by the South-Western Publishing Company of Cincinnati, Ohio, in 1942.

CHAPTER II

REVIEW OF THE LITERATURE

The possibility of exact measurements, and the lure of experimentation have kept typewriting classes favorite fields for investigation. Most of the research done, however, has been in support, or deprecation, of some teaching method (such as the direct method, the contract method, the whole versus the part method, the project method), or with the use of some teaching device (such as the metronome, the stop watch, phonograph records, or the moving picture). The sum total of all these experimentations was aptly evaluated by Harvey Andruss thus:

> Too many of these researches have led us expectantly up to the heights overlooking the promised land of new discoveries and methods, only to leave us standing on the brink of the precipice with a solid wall of darkness ahead.[1]

There was a tendency for the investigators in the field of typewriting to rework these phases instead of ferreting out new approaches. Even as late as 1924 one investigator published a "research study" questioning the "all finger method" for many practical typists.[2] Recalling

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[1] Harvey A. Andruss, Better Business Education (New York: The Gregg Publishing Co., 1942), p. 140.

[2] J. M. Lahy, Motion Study in Typewriting (Geneva: International Labour Office, 1924).

the date the speed expert, Frank McGurrin, first employed this method (1878) gives some idea of the tenacity with which researchers cling to favored fields of investigation.

The speed versus accuracy controversy has been a favorite for many years. The preponderance of proof has agreed with the result reported by Myers in 1925:

> If speed is stressed at the beginning of the formation of a habit, the subject is moderately sure to try to fit old patterns of behavior into a new mold, with the usual result--a distortion of the mold and an inhibiting of the free expression of the pattern.3

This study left the impression that speed emphasis during the early training period was undesirable. Mr. Meyer's experiment, however, was set up with two squads of only seven girls each. The ages of the subjects were not given. One group practiced for accuracy and the other practiced for speed.

It was not the writer's intention to go back to the old training procedure of requiring "perfect copies." This requirement had long been discredited among typewriting teachers as a means of obtaining the most economical use of training time. The comparison desired was between groups neither of which was inhibited by striving for perfection,

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3G. E. Myers, "Speed Versus Accuracy in the Development of Industrial Skill," Journal of Personnel Research, 4:20-2, April, 1925.

but with one group subjected to specific drives for speed and the other allowed to develop individual patterns of both speed and accuracy.

Myers' conclusion in training for typing was supported by experiments in handling machine tools. As expressed by Morris Viteles, these findings were summarized as follows:

> If accuracy is stressed in early training, not only will the quality of workmanship be better at the end of the period, but speed will also be greater than under conditions of learning where quantity of production is stressed earlier in the training period.[4]

There was no quarrel with the desirability of building typing accuracy. It was evident, however, that the training for accuracy which had been given in the past had not developed the practical skill to turn out various useful typed papers. It was in turning out useful typed papers that the high school typing trainee failed upon entering business.[5]

If additional practice was to be provided during the high school training period for building practical skills, it was well to know in just which areas skill had been lacking.

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[4]Morris Viteles, Industrial Psychology (New York: W. W. Morton and Company, Inc., 1932), p. 126.

[5]Harvey A. Andruss, Better Business Education (New York: The Gregg Publishing Company, 1942), p. 149.

Studies revealing the inadequacies of typists' training as reported by business men who employ typists have been made repeatedly. Among those offering specific information were those Thompson,[6] McGibbon,[7] Nelson,[8] and Gemmel.[9] Inefficiencies reported in these studies were:

1. Lack of ability to type accurately
2. Low production
3. Inability to arrange letters on a page
4. Inability to type figures
5. Lack of art in using erasers
6. Failure to proof-read own work
7. Inability to handle tabulations
8. Lack of skill in handling carbons
9. Inability to spell non-technical terms
10. Personality defects

While these studies were in agreement as to the inefficiencies prevalent in typists, and each mentioned the

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[6]James M. Thompson, "Training Better Office Workers," The Balance Sheet, 30:7-10, September, 1948.

[7]Elizabeth Gregg MacGibbon, Fitting Yourself for Business (New York: McGraw Hill Publishing Co., 1941), p. 87.

[8]Selma Nelson, "What Employers Think Beginning Workers Should Know," The Balance Sheet, 30:170-4, December, 1948.

[9]James Gemmell, "For Sale: Antinque Typewriting Methods," The Journal of Business Education, 21:17-18, November, 1945.

necessity for intensified training in these areas, none of them attempted to recommend where or how the training was to be provided.

It was the writer's belief that if the time allotted to speed drills during the first year of training could be devoted to additional practice in the areas of inefficiency, the trainee would develop more skill in these areas. This was not a startling assumption. Teachers know that the things a pupil does are those things which he learns, and the things he improves and fixes as habits are the responses he makes. In other words, if a pupil is expected to punctuate a sentence correctly, the logical technique is to provide practice in the correct punctuation of sentences.

Summary. Investigations in the field of typing have fairly well established the fact that accuracy of response is the first necessity in learning to typewrite. Investigators are agreed that weaknesses in typewriting skills are: lack of ability to type accurately, low production, inability to arrange letters on a page, inability to type figures, lack of art in using erasers, failure to proof-read work, lack of skill in handling carbons, inability to handle tabulations, and inability to spell non-technical terms. No remedy for these weaknesses has been found in the various teaching devices such as the stop-watch, metronome, and phonograph records, nor in requiring perfect copies of textbook material.

Whether or not the neglect of speed drills would lower the trainee's speed below any reasonable standard of achievement was not revealed in the literature, nor was an alternate plan for gaining the time necessary for providing additional practice in areas of inefficiency presented.

It was the writer's belief that if the time allotted to speed drills during the first year of training were devoted to additional practice in the areas of inefficiency, the pupil would attain a higher degree of typewriting skill. A controlled experiment seemed to be the way to find whether this was true. Consequently, an experiment was set up, the procedure and outcomes of which are presented in Chapter III and Chapter IV.

CHAPTER III

THE METHOD OF PROCEDURE

During the spring term the writer administered a diagnostic typewriting test to the pupils taking the second-year typewriting course in an attempt to locate specific weaknesses. The test showed that the group was considerably below standard on applied typing skills. The following fall when three classes in beginning typewriting developed, the writer took advantage of the possibilities of equating two of the classes for experimentation.

Two classes, one following the mid-morning recess and one following the lunch period, were equated with respect to age, academic average, and grade in school.[1] The pupils were numbered in pairs and all papers checked and records kept with as little attention to the personalities involved as the experimenter's self-control would allow. (For the purpose of assigning high school grades an entirely different attitude was felt to be more equitable, so re-evaluation for that purpose was made after the initial

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[1] These criteria were used in view of the conflicting findings regarding prognostic value of other measures of pupil development. (See Summary of Research in Commerical Education, Eighth Yearbook, Commercial Education Association of the City of New York and Vicinity, New York, N. Y., 1938.)

checking had been done and the results had been recorded.) Each group consisted of 29 pupils, 23 from the junior class and 6 from the senior class. Their ages ranged from 15 to 19, and their averages on previous work taken in the high school extended from complete failure through C, B, and A classifications as shown in Table I.

TABLE I

CLASSES A AND B EQUATED
ACCORDING TO AGE, SCHOOL GRADE, AND ACADEMIC AVERAGE

Class A		Class B		Age	School Grade	Academic Average
1.	Ned	1.	Dolores	17	Junior	B
2.	Bessie	2.	Paul	17	Junior	C
3.	Elizabeth	3.	Faye	16	Junior	B
4.	Nell	4.	Lillian	16	Junior	B
5.	Willie Royce	5.	Bobby	16	Junior	C
6.	Dorothy	6.	Virginia	17	Junior	B
7.	Sybil	7.	Marie	16	Junior	A
8.	Alda	8.	Bonnie Lee	17	Junior	A
9.	Caledonia	9.	Lorraine	16	Junior	B
10.	Beverly	10.	Frances	16	Junior	A
11.	Marguerite	11.	Janice	15	Junior	B
12.	Betty	12.	Frances P.	15	Junior	C
13.	Margaret	13.	Peggy	16	Junior	C
14.	Elmer	14.	Lonnie	17	Junior	B
15.	Carolyn	15.	E. W.	16	Junior	B
16.	Mary Lee	16.	Helen Ruth	15	Junior	A
17.	Corrinne	17.	Vivian	16	Junior	A
18.	Paul	18.	Douglas	17	Junior	C
19.	Tifford	19.	Avery	19	Junior	F
20.	Mary Frances	20.	Betty Jane	16	Junior	B
21.	Gene Stroud	21.	Bobby	16	Junior	C
22.	Frances Milton	22.	Peggy Mac	17	Junior	B
23.	Joy	23.	Marjorie	16	Junior	A
24.	Esther	24.	Margaret	16	Senior	B
25.	Catherine	25.	Jerry	16	Senior	C
26.	Milton	26.	Frances	18	Senior	C
27.	Mary Louise	27.	Virginia	19	Senior	A
28.	Elsie	28.	David	17	Senior	C
29.	Peggy	29.	Betty	16	Senior	A

One class (class A) was presented the lessons as planned in the state adopted textbook,[2] but the course for the other class (class B) was lateered to omit all drills for speed building. The time gained by the omission of speed drills was devoted by class B to additional practice on other phases of typewriting skill.

The Procedure for Class A. The textbook material was presented to class A following the instructions as given in the teacher's manual.[3] Time allotments were kept within the limits prescribed on each type of drill and the "aim" for each lesson was presented and class procedures to encourage its accomplishment were maintained.

For an example, Lesson 13, page 27 of the textbook, presented the following material:

Lesson 13

Machine Adjustments:	Use a 60-space line; 5-space paragraph indention; double spacing.	Minutes 1
	Conditioning Practice	3

Learn to type figures quickly; as, 1 3 13 4 8 48 4 7 47 147

3d7j 4f8k 3d7j 4f8k 3d#d 7j&j 4f$f 8k'k #741 $148 don't isn't

Drill: Opportunity comes often to those who know how to profit by it.

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[2]D. D. Lessenberry, Twentieth Century Typewriting, Fourth Edition (Cincinnati, Ohio: South-Western Publishing Co., 1942).

[3]D. D. Lessenberry, Teacher's Manual, Twentieth Century Typewriting, Fourth Edition (Cincinnati, Ohio: South-Western Publishing Company, 1942).

Technique Study 13

10 minutes

Directions: Type the first four sentences twice each. Use the last sentence of the drill for a one-minute timed writing.

Line 1: Regardless of size, spell out numbers at the beginning of a sentence.
Line 2: In stating page numbers, use figures.
Line 3: Dimensions, weights, and units of measure should be expressed in figures.
Line 4: Express the singular possessive by adding 's; the plural possessive, by adding s'.

Forty men worked 184 hours on the project. What is the pay?

He will read from pages 38 to 47. Are we to study page 48?

The rug is 13 by 18 feet. We must pay for it by February 8.

Harry's employer paid him a week's wage for four days' work.

It is a good thing to learn to do some one thing very well.

Exercise 13

10 minutes

Directions: Type the exercise twice on a half sheet with a top margin of 1½ inches (9 spaces).

This paragraph has every letter of the alphabet

Henry Mill, an English engineer, is said to be the first man to have had the amazing idea of the typewriter. No model of his machine is known to exist; yet on January 7, 1714, he was granted a patent by Queen Anne. 215 strokes

Fixation Practice 13

Control of 2-" and 9-((Left parenthesis)

Directions: Type the drill twice 10 minutes

s2s 191 d3d k8k f4f j7j s2s 191 s"s 1(1 s"s 1(1 s"s 191 s2s

Don't forget November 11, 1918. Joe's birthday is March 29.

"Day by day, in every way, I am getting better and better." Isn't it much better just to "wear out" than to "rust out"? Sue is 29 years old. Jim was born in 1927. Are you 24 yet?

In presenting this lesson to class A, six minutes were used to introduce the reaches made with the ring fingers to type s"s (with the left hand) and 191 (with the right hand) before releasing the pupils to type the drill twice. Needless to say, the period often ended before the class had completed the fixation practices in lessons of this nature. When this occurred, the lesson was continued into the next class meeting. This seemed preferable to maintaining such a "break-neck" speed through each period.

The pupils were permitted to type the "Conditioning Practice" just as soon as they were seated at the typewriters. At the end of three minutes the "Technique Study" was introduced through a brief presentation of the rules as stated in lines one through four, and calling attention to the sentence which illustrated each rule. As the pupils typed the sentences twice each, in accordance with the printed instructions, the instructor moved among the machines checking finger movement and accuracy in copying. During this inspection period no interruption was made of the pupils' work, and no comments were made. Errors in fingering and in copying the material were noted on the pupils' records

when the instructor returned to the desk. The instructor's desk was placed in the rear of the room with only the demonstration machine on its raised stand in front of the pupils.

When the practice papers were turned in, notations of errors were written on them and they were returned to the pupils. Each pupil was made to feel free to question any comment or correction made by the instructor. If the errors were general throughout the class, corrections were discussed at the beginning of the following period and the correct procedure demonstrated.

As noted in the directions for typing the "Technique Study," the last line of this study was used as a timed writing. Just before the ten-minute period expired, the instructor touched a small desk bell which was a signal for each pupil to stop wherever he was, to double-space and get set for the call of "All ready? Go." At the end of one minute the call of "Time" was given. Each typist stopped immediately and made a rapid check of his speed accomplishment, then proceded to "Exercise 13" which was typed according to the printed instructions.

Instructional Block II, which included lessons 17 through 26, was entirely devoted to speed emphasis and was covered in the manner in which it is presented in the text.

These drills included "Conditioning Practices," a technique known as "calling the throw," one-minute, two-minute, and three-minute timed writings.

The pupils kept individual records of their progress on the three-minute writings from day to day. Charts for these records were made up by the individuals in the following form:

Three Minute Timed Writings

Lesson	18	19	20	21	22	23	24	25	Average
Errors									
Net Words A Minute									

The instructor "spot checked" the entries on these charts. That is, the lesson numbers were written on slips of paper which were placed in a box. One slip of paper was drawn at random and the lesson numbered on it was checked for errors and net-words-a-minute. The score obtained by the instructor was compared to that recorded by the pupil on his chart. In as much as the students were assured that their academic grades were not given on the basis of these charts, the comparisons were made to check the student's ability to proof-read his own work and to follow correct procedure in arriving at the net number of words typed per minute.

At the end of each period of six weeks, a ten-minute timed writing was taken on an exercise selected from the

material covered within the period. The pupils were allowed to check these writings for errors and to figure their speed. These calculations were carefully checked by the instructor before entering them on the record for determining the outcome of the experiment.

In arriving at figures for the record, the following procedure was used:

Total number of words typed (for instance, 125) 125
Less ten words for each error (in this case, 3) 30
Net words for which credit was given 95

The net words were then divided by the number of minutes for which the typing was done. For example, 95 divided by 10 is equaled to 9.5. The pupil, in this case, was reported as having typed 12.5 gross words per minute and 9.5 net words per minute.

The Procedure for Class B. In presenting the lessons to class B the textbook presentation was altered to exclude all drills which were indicated as having increased speed as their goal. For instance, in Lesson 13 the sentence indicated as a one-minute writing was copied twice as were the other sentences in the exercise.

In presenting the other divisions of this lesson, the same procedure was followed as for class A except the "Technique Study." For this study the the rules were presented, attention was called to the sentences given

illustrating the rules, and then the class was instructed to give three additional illustrations of each rule and to type the rule following each illustration. Several of the students' illustrations were written on the blackboard including the punctuation. Whatever errors were made were corrected, explained, and discussed further until it was apparent that they were understood by a large portion of the class.

Class B did not cover the material as quickly as did class A. When Instructional Block II was reached, it was omitted in class B and the work on Instructional Block III was begun. This procedure put class B ahead of class A, as far as the number of pages in the textbook was concerned.

When the periodic check-up writings were taken, class B was instructed to put a clean sheet of paper in the machines and the material to be copied was indicated. The suggestion was made that the pupils wait for the signal to start and when the signal was given, to type "as far down the page" as they could before the signal was given to stop. They were cautioned to stop immediately when the signal was given. No fanfare, or exhileration was exhibited in giving these instructions. No indication was given that it was to be a drive for speed.

In presenting the unison drill, the instructor started by spelling out the key combination to be typed: s-2-s space, 1-9-1 space, 4-3-d space. The exercise was begun at the 15 five-stroke words a minute level, and the speed gradually increased until the inability of the pupils to maintain the speed broke the rhythm. The letter calling was then dropped and the class permitted to continue for about half a minute on the combinations. When the calling stopped, the slower pupils dropped back to their individual speed level, while the quick-fingered pupils continued to build higher speed.

The speed building inherent in this type of drill was the only speed encouragement to which the members of class B were subjected.

One motivation scheme used in class B was to have the members of the class make inquiries in town to see what charges public stenographers were making for various forms of typed papers. The class was assisted in transposing these charges into income possibilities in terms of the number of pages typed in half an hour. Class members selected the incomes they desired and worked to produce enough letters and pages of typewriting to earn the desired income. This approach encouraged a serious effort to acquire skill in the operation of every time-saving mechanism on the typewriter, and in handling supplies.

In both class A and class B the pupils were encouraged by every means within the instructor's repertoire to establish correct stroking habits. A precise, center of the key, quick stroke was demonstrated repeatedly, and the class drilled on each new key as it was introduced until the pupils approximated the demonstration.

Accuracy of stroke was held up as the ideal, but "perfect copies" were not required. Unison drills were kept up to the speed of 15 to 20 words a minute because the instructor understood that slow motions are not the same as fast motions; and if least waste of learning is to be experienced, standard speed of motions should be practiced from the beginning of the formation of a habit.

In making the regular check-ups at the end of each six-weeks grading period, the same material was used by all members of both classes.

Summary. Two classes in first-year typewriting were equated with respect to age, academic average, and grades made on previous work taken in the high school. These groups were made up of 29 pupils, 23 from the junior class and 6 from the senior class. Their ages ranged from 15 to 19, and their academic averages ranged from F through C, B, and A classifications.

Class A was presented the lessons in typewriting as planned in the state adopted textbook. Class B was presented

the material in the same textbook, but all drills aimed specifically at speed building were omitted. The time gained by the omission of the speed drills was devoted to additional practice on the rules of punctuation, tabulations, syllabication of words, and other typewriting skills.

Accuracy of stroke was held up as the ideal, but "perfect copies" were not required of either of the classes. At the end of each six-weeks grading period both classes were given a ten-minute timed writing. Scores on these tests were recorded and kept for comparison. The results of these tests and how they compared are shown in Chapter IV.

CHAPTER IV

RESULTS OF THE EXPERIMENT

All of the pupils in the two classes under observation were enrolled for their first class in typewriting. After proceding for the first six-weeks period, the check-up test was given. Test scores resulted in an average of 17.37 gross words for class A (the speed drill class) and 9.96 gross words for class B (the class where the speed drills were omitted).

At the end of the second six-weeks period, class A averaged 23.24 gross words, and class B averaged 17.55. At the end of the third six-weeks period, class A had fallen back to an average of 22.75, class B had progressed to 21.58. This ended the first semester of work. Both classes were within the normal range, that is, if the normal range as given in the Encyclopedia of Educational Research[1] was quoted in gross words per minute.

The fourth, fifth, and sixth six-weeks periods ended with class A having averaged 24.13, 28.48, and 36.2 gross words per minute respectively. Class B for the same periods in their respective order showed 26.20, 27.86, and 29.2.

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[1] Walter S. Monroe, Editor, Encyclopedia of Educational Research, (Chicago: The Macmillan Publishing Company, 1941), p. 323.

The speed drill class had averaged 3.4 words per minute over the class which had no speed drills. On the final test, the speed drill class had averaged seven words per minute over the other class. The highest speed record made by an individual pupil in class A was 53 gross words per minute, the highest speed record made by an individual pupil in class B was 44 gross words per minute. The lowest record on the final test made by an individual in class A was 21 gross words per minute. The lowest on the same test made by an individual in class B was 22 gross words per minute.

When a typist makes an error, he has two choices for correcting it. He may "strike over" the letter, or he may erase the error and put in the correct letter. Strike-overs are never acceptable, therefore some allowance may be made in typing speed for the time that would be consumed in erasing the error and substituting the correct letter. To allow for the time required to make correctings, the rules followed for the international typewriting speed contests deduct ten words for each error from the total number of words typed. (This process has been described on page 20.)

The class scores were computed on the basis of a ten-word deduction for each error and the results were

as follows: class A averaged 5.48; 12.93; 13.13; 12.27; 17.03; and 20.41 for the six periods in order of first through sixth. Class B in the same order showed an average of 7.62; 13.72; 19.20; 19.76; 24 and 25.82. Class A averaged 13.56 net words per minute for the six periods. Class B averaged 18.35 net words per minute, or 4.79 words above the average for class A.

TABLE II

AVERAGE GROSS AND NET WORDS ATTAINED ON EACH OF THE SIX TESTS

Test	Net		Gross	
	Class A	Class B	Class A	Class B
1	5.48	7.62	17.27	9.96
2	12.93	13.72	23.24	17.55
3	13.13	19.20	22.75	21.58
4	12.27	19.76	24.13	26.20
5	17.03	24.	28.48	27.86
6	20.41	25.82	36.2	29.2

The highest speed record made by an individual pupil in class A was 38 net words per minute, the highest speed record made by an individual pupil in class B was 40 net words per minute. The speed attainments of the individual pupils are shown in gross words per minute on Table II. They are shown in net words per minute on Table III. A comparison of the score averages from the six tests is shown by means of a graph in Figure 1.

TABLE III

GROSS SPEED ATTAINED BY SUBJECTS IN EQUATED GROUPS IN FIRST YEAR TYPEWRITING

	Test One		Test Two		Test Three		Test Four		Test Five		Test Six	
Subject	Class A	Class B	Class A	Class B	Class A	Class B	Class A	Class B	Class A	Class B	Class A	Class B
1	25	12	30	20	30	25	35	30	44	35	53	37
2	24	12	29	20	27	25	24	30	32	36	45	34
3	23	12	29	20	28	24	25	30	30	29	44	30
4	23	12	29	20	27	24	24	27	30	27	40	27
5	23	12	28	18	29	25	24	31	31	33	43	30
6	22	12	28	20	29	25	23	30	31	31	44	31
7	20	11	27	20	27	23	27	29	38	30	40	31
8	19	11	27	22	28	28	35	30	37	32	40	34
9	18	11	22	18	25	24	22	26	30	28	42	30
10	18	11	23	18	24	24	31	26	34	25	30	28
11	18	11	21	19	23	25	25	27	26	26	39	26
12	18	10	25	16	20	18	20	20	26	22	39	25
13	17	10	24	19	23	20	22	23	37	26	39	29
14	17	10	22	19	24	20	30	23	37	26	39	27
15	17	10	21	20	23	23	30	34	27	44	39	40
16	17	10	22	18	20	24	30	26	26	22	28	27
17	17	10	23	16	20	20	20	31	25	33	27	30
18	17	10	27	17	28	19	20	23	25	26	27	28
19	19	9	25	18	19	22	20	20	24	24	27	25
20	12	9	21	16	19	18	25	25	24	28	37	30
21	15	9	21	19	19	20	29	21	33	24	39	25
22	14	9	19	20	18	17	23	28	29	32	42	38
23	14	8	26	14	20	17	20	24	18	21	35	26
24	14	8	19	16	21	17	27	23	28	25	39	27
25	13	8	19	15	18	20	17	23	28	21	29	28
26	13	8	17	10	23	16	17	26	18	30	28	32
27	13	8	20	15	18	21	25	22	25	25	34	26
28	12	8	15	18	15	21	15	27	21	24	21	24
29	12	8	15	17	15	21	15	25	22	23	23	22

Class A received intensive practice on speed building
Class B received intensive practice on allied typewriting skills

TABLE IV

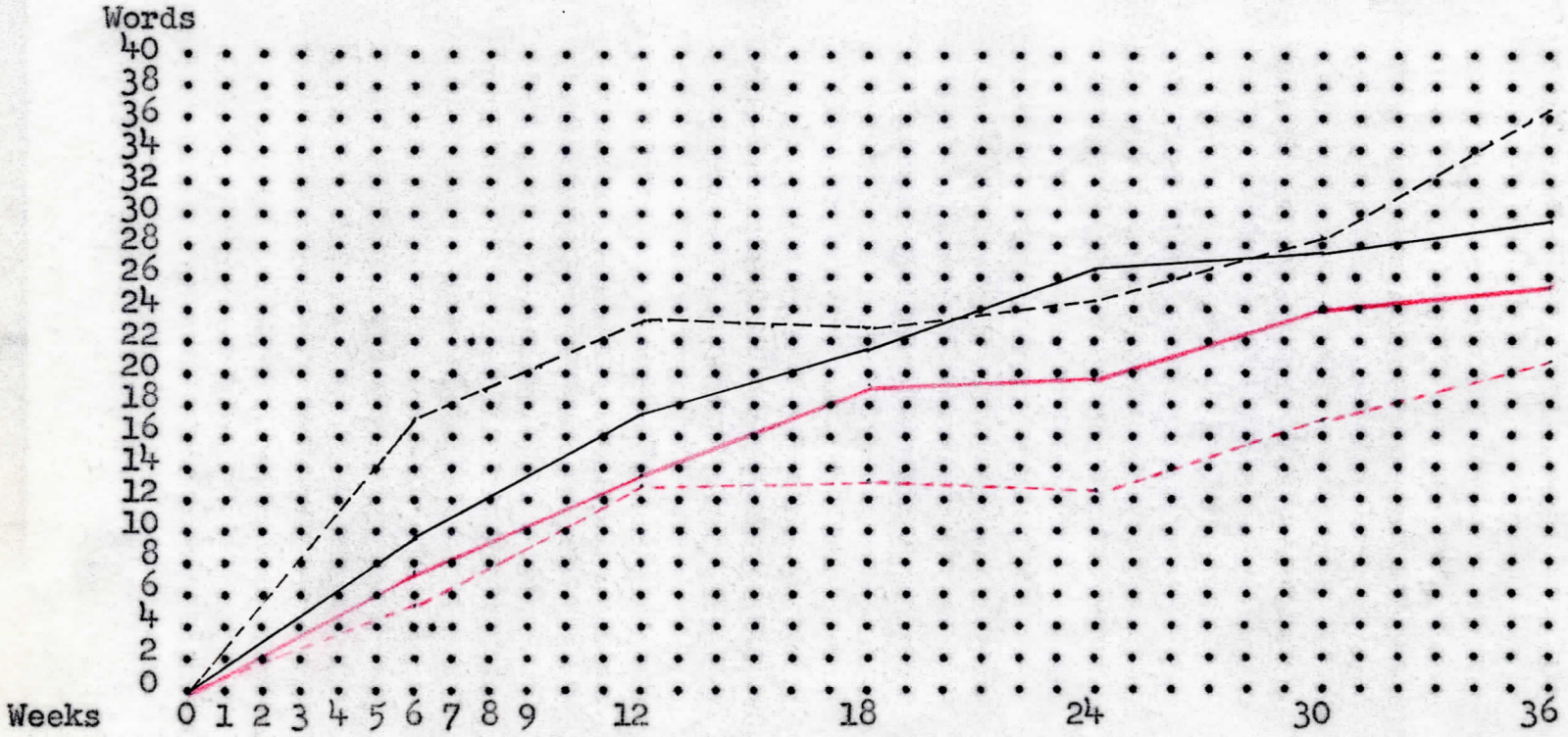
NET SPEED ATTAINED BY SUBJECTS IN EQUATED GROUPS IN FIRST YEAR TYPEWRITING

	Test One		Test Two		Test Three		Test Four		Test Five		Test Six	
Subject	Class A	Class B	Class A	Class B	Class A	Class B	Class A	Class B	Class A	Class B	Class A	Class B
1	15	10	17	16	15	22	30	29	35	32	30	35
2	15	10	16	16	15	22	12	27	18	32	25	32
3	15	10	16	15	15	21	12	26	18	20	25	24
4	14	9	16	15	15	21	14	26	18	25	24	26
5	13	9	16	15	10	22	14	29	19	30	23	30
6	13	9	15	16	14	22	13	28	17	30	21	29
7	13	9	15	17	14	24	15	27	17	27	21	29
8	12	9	15	15	15	19	15	23	17	21	15	32
9	12	8	15	15	13	22	12	25	17	23	35	30
10	-12	8	20	14	22	22	10	23	16	23	23	27
11	10	8	11	16	13	23	10	25	16	23	27	25
12	10	8	9	16	13	18	12	19	16	20	28	24
13	10	8	9	14	13	18	10	21	18	22	22	23
14	10	8	12	14	14	18	10	20	15	23	21	23
15	10	8	13	14	14	20	13	30	18	40	13	40
16	9	7	15	14	11	22	13	22	20	18	13	20
17	10	7	15	13	12	18	13	29	21	30	15	30
18	9	7	20	13	21	17	15	20	18	20	15	26
19	- 6	7	8	15	12	19	15	17	18	21	18	22
20	- 4	7	8	12	12	15	10	22	15	22	18	27
21	-10	7	7	13	12	17	12	15	18	21	17	23
22	1	7	10	13	11	15	10	28	15	28	29	32
23	8	6	10	13	10	16	12	20	17	19	15	20
24	- 8	6	10	12	10	16	10	27	15	20	38	20
25	- 7	6	14	12	13	19	9	20	14	17	14	17
26	- 6	6	10	10	12	15	9	22	14	26	14	27
27	5	6	7	10	10	18	9	15	7	22	12	20
28	5	6	7	10	10	19	9	21	14	21	10	19
29	3	6	9	10	10	17	8	17	13	20	11	17

Class A received intensive practice on speed building
Class B received intensive practice on allied typewriting skills

Figure 1

COMPARISON OF AVERAGE GROSS AND NET WORDS ATTAINED ON EACH OF THE SIX TESTS



An analysis of the number of errors made is even more revealing. The average number of errors for the speed drill class on the six tests were: 11.8; 12.57; 9.2; 13.79; 12 and 16.37. The class drilled in applied typing skills averaged 2.31; 4.17; 2.41; 3.25; 3.51 and 3.24 errors. Or, an average of 12.62 errors for the speed drill class and and average of 3.16 errors for the other.

TABLE V

AVERAGE NUMBER OF ERRORS
MADE ON EACH TEST

Test	Class A	Class B
1	11.8	2.31
2	12.57	4.17
3	9.2	2.41
4	13.79	3.24
5	12.	3.51
6	16.37	3.24

In class A only one pupil on one test made a ten minute test with only one error. Class B showed one test with no error and one with only one error at the end of the first six weeks, four with one and one with none at the end of the second, third, and fourth periods; one with one in the fifth; and four with one and four with none on the sixth test.

At the culmination of the training period, the highest net speed show in class A was 38, the median was 21, and the

and the lowest was 10 net words per minute. For class B the highest net speed shown was 40, the median was 23, and the lowest was 17 net words per minute.

Scores on Applied Typing Skills. The tests on applied typing skills given to the two groups, copies of which are shown in the appendix, consisted of a series of exercises and questions covering the material in the text-book.

Class A barely covered the material in Instructional Block XIII which is the traditional place to end first year typewriting. Class B had time to give this section complete coverage and to go back and pick up a review of the material with which the students felt they needed additional assistance.

The average test scores on this material were: Class A, 63.8; 62.9; 69.7; 62.6; 64.7; 60.5. Class B averaged 80.9; 78.9; 84.1; 79.1; 77.7; and 74.4.

On not one individual test did any student in Class A make above 83 per cent. The highest average for any individual for the six tests was 79 per cent, while 17 averaged below 70 per cent (the passing grade). In class B seven averaged above 83 per cent with only four falling below the passing average of 70 per cent, and three averaged as high as 97 per cent.

Class averages on the six tests are shown in Table V and individual grades are shown in Table VI.

TABLE VI

CLASS AVERAGES ON THE SIX TESTS
ON APPLIED TYPING SKILLS

Test	Class A	Class B
1	63.8	80.9
2	62.9	78.9
3	69.7	84.1
4	62.6	79.1
5	64.7	77.7
6	60.5	74.4

In grading these tests nothing was deduced for typing errors other than those made in presenting the data which directly answered the question. For instance, in the sentence, "Our check of $150 should be mailed on May 8," the only errors penalized would have been failure to capitalize the word our, errors in $150, failure to capitalize May and errors in expressing the 8. The following sentence would have been accepted as correct on anything other than a speed test: "Our chack far $150 should be amklled on May 8."

TABLE VII

INDIVIDUAL SCORES ON THE SIX TESTS ON ALLIED TYPING SKILLS

	Test One		Test Two		Test Three		Test Four		Test Five		Test Six	
Subject	Class A	Class B	Class A	Class B	Class A	Class B	Class A	Class B	Class A	Class B	Class A	Class B
1	60	86	80	96	82	98	72	96	82	98	80	95
2	54	94	60	96	80	96	72	96	82	98	80	95
3	72	90	78	90	80	96	72	96	82	96	80	95
4	70	78	68	90	80	94	72	84	78	84	80	90
5	40	80	68	88	78	94	70	84	78	84	75	90
6	30	82	70	88	78	90	70	84	78	84	75	85
7	78	80	80	88	78	90	70	84	74	84	75	85
8	62	90	74	86	76	90	70	84	74	82	75	85
9	80	78	76	84	76	88	68	82	74	82	70	85
10	64	80	56	82	76	88	68	82	74	82	70	85
11	76	68	70	80	74	86	68	82	74	82	70	80
12	72	86	66	80	74	86	68	82	70	82	70	70
13	68	86	64	80	74	84	68	80	70	80	70	70
14	54	82	48	80	74	84	66	80	70	78	65	70
15	26	84	70	78	72	84	66	80	70	78	65	70
16	48	78	72	78	72	82	66	80	70	78	65	70
17	68	76	60	76	72	82	64	78	68	78	60	75
18	72	74	80	74	68	82	64	78	68	76	60	75
19	60	72	76	74	68	80	64	78	68	76	60	75
20	54	68	72	74	66	80	62	78	68	76	55	75
21	78	69	72	74	64	78	60	76	66	76	55	75
22	82	72	48	72	62	78	58	74	66	76	55	75
23	76	74	62	72	60	78	58	72	66	74	55	75
24	76	74	62	70	58	78	56	72	40	74	40	60
25	44	74	64	70	58	78	56	68	38	70	40	60
26	58	80	68	68	56	76	54	68	38	70	40	60
27	70	82	70	68	54	76	48	66	36	54	35	60
28	64	40	72	58	50	76	36	66	34	52	20	45
29	66	66	40	56	48	68	32	64	32	50	15	40

Class A received intensive practice on speed drills
Class B received intensive practice on allied typing skills

CHAPTER V

SUMMARY OF THE EXPERIMENT, CONCLUSIONS AND RECOMMENDATIONS

The writer's experience in the business world indicated that high school courses in typewriting were insufficient preparation for remunerative employment. It seemed reasonable to expect more satisfactory results from the high school courses unless some necessary factor for the acquisition of typewriting skill was being omitted from the training period.

Experience, and the literature available indicated that the most disturbing weaknesses in typists, other than personality faults, were lack of accuracy, speed, knowledge of business forms, correct erasing technique, tabulations, carbons, English punctuation, the application of grammatical rules, and insufficient total production. Training in any one of these areas could be extended into a class in itself. The problem was to determine which of these areas could be most profitably attacked in the first-year typewriting course.

A time analysis of the state adopted typewriting textbook indicated that a considerable part of the training period was devoted to the acquisition of typewriting speed. Would the elimination of this training, which to the writer

had often appeared as "training a pupil to take speed tests," handicap the pupil in his total development? Would his speed and accuracy loss outweigh the gain in applied typing skills?

It was assumed as the responsibility of the instructor to employ the training procedure which would result in the most beneficial use of the pupils' time. The problem was to determine whether pupils in first year typing developed a higher degree of skill by devoting time to practice for speed of key manipulation, or by devoting time to other aspects of typewriting proficiency.

Not finding the answer in reported investigation in the literature in the field of typewriting education, an experiment was set up with equated high school classes in first year typewriting. One class was presented the lessons as planned in the state adopted textbook. The course for the other class was adjusted to omit all drills for speed building. The time gained by the omission of speed drills was devoted to additional practice on other phases of typewriting skill. Records were kept to determine their relative progress in the development of typing speed and accuracy, and in other aspects of typewriting proficiency.

Identical tests were given to all members of both classes at the close of each six-weeks grading period.

Results of these tests indicated that the class subjected to the speed training averaged five words a minute higher on gross words typed. The best record made by an individual typist in the speed drill class was thirteen gross words a minute above the best record made by an individual typist in the other group.

However, after deducting the ten-word penalty allowed for each error according to the rules for the international typewriting contest,[1] the net-words-per-minute scores were compared. The class which received the speed drill practice averaged 4.8 net words a minute less than the class which received no speed drill practice. The best net word record made by an individual in the speed drill class was 38 words per minute. The best net word record made by an individual in the applied typing skill class was 40 words per minute--which was made on a perfect test.

Grades made on the tests given on the other typing skills at the end of each six-weeks grading period clearly indicated the advantage of the additional training in tabulation, punctuation, letter forms, and in the use of the typewriter mechanisms. The best grade made on these tests by a pupil in the speed-drill class was 82, and seventeen

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[1] D. D. Lessenberry, 20th Century Typewriting, Third Edition, (Cincinnati: South-Western Publishing Company, 1941), p. 326.

members of the class failed to accumulate a passing average of 70 per cent. The best grade made by an individual pupil in the applied typing skills class was 98, and only four members of the class failed to accumulate a passing average. The highest 6-test average for any individual in the speed drill class was 79 per cent, while three individuals from the other group averaged as high as 97 per cent.

Conclusions. The results of this experiment indicate that drills for speed building during the first year of training make a very negligible contribution to the acquisition of typewriting speed where speed is computed in gross words a minute. Where speed is computed in net words a minute, the errors made while attempting to type rapidly reduce the speed until it is below that attained by pupils who receive no speed drills.

Stated in the reverse form, the results of this experiment indicate that pupils in their first year of training develop a somewhat lower gross typewriting speed, but make considerably fewer errors. When their speed attainments are computed in net-words-a-minute, they approximate or excel the speed developed by classes subjected to speed drills.

Results of the tests on allied typing skills indicate that pupils in their first year of training definitely benefit from additional practice in these areas.

The writer concluded that the time spent on speed drills in a class of high school pupils during the first year of typewriting training would be better spent on additional practice in the application of the use of typewriting on personal and business papers, that the acquisition of net speed is not hindered by this shift of emphasis, and that the acquisition of other typewriting skills is much advanced thereby.

In the opinion of the writer, motivation was superior in the applied skills group, interest was keener, and the atmosphere of the classroom more relaxed, more sincere, and marked by the absence of pupil competition.

Suggestions for Further Investigation. More investigation is needed to determine whether this same process will show these outcomes under a variety of instructors. It would also be valuable to determine whether the business success of a class receiving the additional training in applied typing skills is superior to that of the members of a class who do not have this training.

Another problem which could result in some very practical information would be to determine the comparative success of trainees who had instruction from a person with actual business experience and those who had instruction from a person who had only the academic training.

Recommendations. It the light of the findings of this experiment, the writer would like to recommend to typewriting instructors that speed drills be omitted from the first year of typewriting training in the high school, and that as much time as possible be devoted to practice in applying typing skill to practical situations. Speed emphasis can be given later in the training period where rapid typing may be more readily attained.

It would be well, too, to encourage the individual pupils to use their typewriting skill at every opportunity in preparing their lessons and notebooks for other high school classes. This is an aspect of typing skill filled with motivation possibilities.

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Appendix

TEST NO. 1

I. Name and identify ten parts of the typewriter. 20 points

II. Make and give the use for ten typewriting symbols. 20 points

III. State the rule governing the punctuation of each of the following sentences. 40 points

1. Forty men worked 184 hours on the project.
2. He will read from pages 38 to 47.
3. The rug is 13 by 18 feet.
4. Harry's employer paid him a week's wage.
5. He wrote, "Come at six."
6. He sent a check for $294.
7. Al is 17 years 3 months and 8 days old.
8. His fingers are "running wild," he says.
9. Jane gave Tom 1⅓ of the 3 apples.
10. Tom is 1/4 of Mary's age; Robert is 1/2 of Tom's; how old is Mary?

IV. Copy the following paragraph using a 50 space line, on a half sheet of typewriting paper. 20 points

It is quite easy to place some dates. In 1775 America refused to be subject to England. Clark explored the way to the great Northwest in 1779. "Old Hickory" seized Florida in 1814. These dates in history have meaning for all of us.

TEST NO. 2

I. State the rules governing the punctuation of the following sentences: 20 points

1. We quoted him on November 9, 17, and 20.
2. Our check for $150 should be mailed on May 8.
3. They have owed me $27.50 on Bill #613 since May 4.
4. He said, "There is worth to work such as she has done."
5. Isn't the interest rate of 4% to be allowed on the new note?

II. Center the following information one one-half sheet of typewriting paper: 20 points

Name, Address, Date, Age, School, Grade.

III. Copy the following sentences, punctuating them correctly: 20 points

1. Do your best he said and good will come to you
2. Jims policy is no 730512. it expires june 4 1958.
3. Dr. Becker is in his office at 10-30 a. M. and 2-45 P. m.
4. Order #316 for morgan and howe of dallas comes to $2583.00.
5. Will you please give me a full sized sheet of paper 8 and a half by eleven

6. have you read shields and wilsons consumer-economic problems
7. max ross article have you had your daily dozen is fine
8. sue is twelve years 7 months and six days old and weighs 74 pounds
9. he said will all the work be done by the time you leave
10. paul bought a suit for thirty dollars. Morton paid eighty-five ¢ for a tie

IV. Show the figures for tabulating four columns of four-letter words across an 8½-inch sheet of paper. 20 points

V. State and illustrate five rules for syllabication. 20 points

TEST NO. 3

I. You are typing the following words, the bell rings on the typing of the first letter of each, show the syllabication: 20 points

business	learned	possession	commercial
alone	separate	reference	
very	stressing	registration	

II. You are typing the following words and the bell rings on the typing of the third letter of each word, show the syllabication: 20 points

relaxed	control	material	attractive
beginning	attention	knowledge	
accurate	stopped	approximately	

III. Illustrate the following rules for punctuation: 50 points

1. At the end of a quotation, a semicolor or a colon should follow the quotation mark; a period or a comma should precede the quotation mark.
2. In a quotation, a question or exclamation mark is typed before the quotation mark if the quoted matter is a question or an exclamation.
3. A quotation within a quotation is enclosed in single quotation marks.

4. When referring to articles and books, it is customary to place in quotations the titles of articles and to underscore or type entirely in capitals the titles of books.

V. Insert this sheet of paper into your typewriter and fill in the missing letters in the sentence given below. 10 points

There is no pri e too dear to pay for p rfec ion.

The sentence should read: There is no price too dear to pay for perfection.

TEST NO. 4

I. State the rules governing the punctuation of the following sentences: 25 points

1. On a trip of 1,000 miles your tires will flex fully 1,500,000 times.
2. As a boy he worked for 90 cents a day; as an expert he asked for $50.
3. The boy's desire to take a business course changed his father's plans.
4. The men's club met to discuss the boys' work that was to be undertaken.
5. We sold South Pacific 4s at 75 3/8 after buying them earlier at 62 5/8.

II. Show the proofreader's marks which would indicate the following corrections: 30 points

1. Caret, for something left out. Insert marginal addition.
2. Set in lower case
3. Change capital letter to lower case
4. Begin paragraph here
5. Insert space
6. Insert comma
7. Close up
8. Change lower case letter to capital

9. Set in capitals

10. Transpose

III. Illustrate the following rules of punctuation:

25 points

1. A trade name or trade-mark may be indicated by quotation marks.

2. Indicate a quotation within a quotation by the single quotation mark.

3. The plural form of letters and figures may be expressed with the apostrophe and s.

4. In market quotations, express the plural of figures by adding the s without the apostrophe.

5. Use d, st, or th when the day of the month stands alone or when it precedes the name of the month.

IV. Write a brief, personal note to your left-hand neighbor, address an envelope, fold, and insert the letter into the envelope. 20 points

TEST NO. 5

I. Center on one-half sheet of paper the Roman numerals and their Arabic counterparts. Use the left-hand column for the Arabic numerals. 20 points

II. Give the correct outline form for a subject having three major headings, each with three subheadings. Give some of the subheadings additional smaller divisions. 20 points

III. You are typing the following words and the bell rings on the typing of the first letter of each word, show the syllabication: 20 points

comprehend	questions	gained	enough
possession	knowledge	situation	
around	neatly	portion	

IV. The commercial club of our school is giving a formal luncheon introducing Dr. D. D. Lessenbury who will speak following the meal at the Lyons Hotel, January 4, 1941, at 12:15. Type five invitation requesting an R. S. V. P. 20 points

V. Copy the following sentences, punctuating them correctly: 20 points

1. He wrote letters on march 3 9 and 22 no reply came until august 14

2. on the 15 of may they bought furnishings that amounted to 1,720 dollars
3. his ten-page booklet 4 and one-half by seven inches can be carried in your pocket
4. the father and mother plans for their sons work did not please don
5. your son in law will get first class cooperation from joe and robert

TEST NO. 6

I. Type a brief business letter to your high school principal, using a 50-space line. 15 points

II. Identify the seven parts of the letter which you have written by placing an arrow from each to the identification placed in the left-hand margin. 10 points

III. Use the letter prepared in question 1, type it as follows: Letter No. 1, block form, open punctuation; letter number 2, indented form, closed punctuation; letter number 3, block form, mixed punctuation; letter number 4, semi-blocked, mixed punctuation; letter number 5, inverted paragraph form, open punctuation. 25 points

IV. Center the following information in proper form on a half sheet of typewriting paper. Use horizontal and vertical centering. Show your work in arranging the tabulations. The Liberty College Bond Holdings and Income From Bonds for 1941 are as follows: Abbott and Company, book value, $9,962.25, actual value $5,250, income $200; Boonesville Indiana School District $500 book value, $500 actual value, income $22.50; TWW Products, Inc., book value $3,890, actual value $3,480, income $220; McKnight, Bourne and Company, book value $2,805, actual value $2,700, income $679. Glasgow Lodge (1st Series) book value $12,591.50, actual value, none, income none. Farm Products, Inc., book value $500, actual value, same, income $15.